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(54)【発明の名称】 バタフライ弁の駆動装置及びその製造方法

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(57)【特許請求の範囲】

【請求項1】中心形バタフライ弁に設けた取付フランジ面に複数の凹部又は凸部を形成し、前記凹部又は凸部と係脱可能に嵌合して中心形バタフライ弁の弁棒の回転方向に位置決め係合作用を行なう凸部又は凹部を有する同一寸法及び構造の取付面をケーシングの上下両面に形成し、該取付面の中心にウォームギヤ軸部孔を形成し、該ウォームギヤ軸部孔に軸支してケーシング内に配置したウォームギヤに弁棒連結孔を上下に貫通して穿孔し、ウォームギヤと噛合するウォームのウォーム軸をケーシング外に延出してその延出端に操作ハンドルを取り付けると共に、前記弁棒連結孔に回転を一体にしつつ中心形バタフライ弁の弁棒を挿脱可能に嵌合させたことを特徴とするバタフライ弁の駆動装置。

【請求項2】ケーシングは、中央部分において上部ケー

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シングと下部ケーシングに2分割され、上部ケーシングと下部ケーシングは同一の形状、寸法を有する浅い皿状の成形体により構成され、接合して箱状のケーシングに構成したことを特徴とする請求項1記載のバタフライ弁の駆動装置。

【請求項3】ケーシングに設けた取付面に開閉表示を施す一方、弁開度遠隔指示器を取付面に着脱可能に取り付けたことを特徴とする請求項1又は2記載のバタフライ弁の駆動装置。

10 【請求項4】凹凸嵌合は、弁棒連結孔を中心とする対称位置に配設した複数の凸部と、該凸部にそれぞれ嵌合する複数組の凹部により構成され、各組の凹部を弁棒連結孔を中心とする異なる位相位置に設けて、取付フランジ面に対するケーシングの取付位置を選択可能として、操作ハンドルの位置を変更出来るようにしたことを特徴と

する請求項1、2又は3記載のバタフライ弁の駆動装置。

【請求項5】中央部分において上部ケーシングと下部ケーシングに2分割され、上下両ケーシングは同一の形状、寸法を有する浅い皿状の成形体により構成され、接合して1個の箱状のケーシングとなるバタフライ弁の駆動装置のケーシングの製造において、上部ケーシング及び下部ケーシングを上金型と下金型の対からなる1面の金型で成形し、後加工を不要としたことを特徴とするバタフライ弁の駆動装置の製造方法。

【請求項6】上金型と下金型の接合面を上下ケーシングの接合面となるようにしたことを特徴とする請求項5記載の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する分野】この発明は、中心形バタフライ弁の駆動装置に関し、特に配管への取付後において駆動装置を分解することなく、操作ハンドルの位置を任意に変更可能とすると共に、位置の変更後も操作ハンドルの回転方向が変わらないようにすることの可能な駆動装置ならびにその製造方法に関する。

【0002】

【従来の技術】弁体の回転中心に弁棒を配した中心形バタフライ弁は従来公知であり、種々の流体の制御に広く用いられている。かかるバタフライ弁の開閉をもたらす弁体の回転は、弁体を軸支する弁棒の一端を弁本体の外部に延出させて、該弁棒の延出端にウォームギヤを連結し、該ウォームギヤと噛合するウォームのウォーム軸にハンドルを取り付けて駆動する方式が手動操作の方法としては最も一般的である。

【0003】このような手動操作方式の駆動装置を備えたバタフライ弁を比較的余裕のあるスペース内において配管系統に配設する場合は、操作上特に大きな問題は生じない。しかしながら、船舶の機関室のように狭隘で且種々の機器が輻輳して配設されているスペースや、プラントのように多数のバイブラインに複数のバタフライ弁が配設され、バタフライ弁毎に開閉操作が必要とされる場合は、弁の配設位置、操作ハンドルの位置および回転方向等によって作業能率に大きな差異が生じて来る。

【0004】図11は、複数のバイブラインPL1~PL3が平行に配管され、各バイブラインPL1~PL3にそれぞれ駆動装置を備えたバタフライ弁V1~V3が取り付けられ、各バイブラインPL1~PL3の間に操作のために作業者が出入りする通路R01~R03が配されている状態を示し、各バタフライ弁V1~V3の駆動装置には同一方向に操作ハンドルHD1~HD3が伸び出している。従って、この場合に各バタフライ弁V1~V3の開閉操作をするには、作業者が3本の通路R01~R03を順次出入りして操作ハンドルHD1~HD3を個別に操作しなければならず、作業能率が悪かった。

【0005】そこで、図12に示すように、第1のバ

フライ弁V1に隣接する第2のバタフライ弁V2を駆動装置と共にバイブラインPL2から一旦取り外して180°回転させて取り付けることにより、第1の通路R01において2つのバタフライ弁V1、V2の開閉操作を行いうるようにして、第2の通路R02のためのスペースを省略することが可能となる。しかしながら、この場合操作ハンドルHD1、HD2の位置が整列せず操作性及び外観が悪いという不具合がある。又、図13は、実公昭61-46309号公報に開示のウォーム軸を駆動装置のケーシングから左右方向に延出させ、操作ハンドルをウォーム軸の両端に選択的に取り付けできるようにした構造により、操作ハンドルHD1~HD3を整列させたものであり、操作性、外観性は図12の場合よりも改善されている。

【0006】しかしながら、図13の場合には第1のバタフライ弁V1と第2のバタフライ弁V2の開閉操作方向が逆になるため、操作方向を誤るおそれがあり、作業能率、緊急時における迅速性、安全性の点から好ましくなかった。すなわち、通常弁の回転方向は、日本工業規格により、操作ハンドルを反時計方向に回転したとき閉弁し、時計方向に回転したとき開弁することが規定されているが、図13の場合には、第2のバタフライ弁V2は、これとは逆の方向に操作ハンドルを回転して弁の開閉を行うことになる。

【0007】更に、駆動装置のケーシング及びバタフライ弁の弁本体等を合成樹脂材料等で構成した場合、操作ハンドルの回転によりウォーム及びウォームギヤを介して弁棒に連結された弁体を回転させるため、ウォームギヤ軸部に大きなトルクが生じ、このトルクにより駆動装置のケーシングに設けた取付面とバタフライ弁側に設けた取付フランジ面の間にズレが発生し、弁の開閉位置に狂いが生じて流体の漏洩の原因となる。

【0008】又、操作ハンドルの位置を変更すると、これにともなって弁の開閉表示手段も交換する必要性があり、弁開度遠隔指示器を付け替えるためにケーシングの上面に取付孔等を新設する必要性があった。

【0009】又、従来から駆動装置は実公平7-12786号公報に示されているように、ケーシングと蓋から構成され、これらを結合して一体化している。すなわち、ケーシングと蓋は、その形状、寸法が異なり、それぞれ別個の金型で成形し、機械加工して結合されている。このため、操作ハンドルの位置を逆方向に変更する場合には、ケーシングと蓋を分離し、内部のウォームギヤ及びウォーム軸を一旦取り出して所定方向に組み替えなければならず、作業工数及び緊急時における迅速性の点から好ましくなかった。かかる従来の駆動装置は、主として鋳鉄等の鋳造品が多く、ケーシング及び蓋の形状により作業能率、外観（鋳肌）が好ましくなく、結合部、摺動部、ボルト孔等を全て機械加工で形成する必要があった。

【0010】

【発明が解決しようとする課題】この発明は、狭隘なスペース或は配管、機器が輻奏している個所においてもバタフライ弁並びに駆動装置を整然と配置可能にすると共に、操作ハンドルの方向性を整列させて操作時における無駄な動きをなくして作業性を向上させるようにし、且弁開閉のための操作ハンドルの回転方向を一致させて操作ミスをなくして緊急時の迅速性及び安全性を高く出来るバタフライ弁の駆動装置を提供せんとするものである。

【0011】又、駆動装置の製造時に量産が可能で、工数の削減、品質が安定し、外観が美麗で、作業環境が良い等の目的を達成することが出来、従来ケーシングと蓋の2面の金型が必要であったものを、1面の金型でケーシングと蓋の成形を可能として、金型費用の削減を図りうると共に、浅い皿状に成形して成形方案を容易とし、成形費用の削減を図ることが出来、しかも上下兼用のケーシングをほとんど後加工する必要なく製造可能な製造方法を提供せんとするものである。

【0012】

【課題を解決するための手段】上記課題を解決するためにこの発明が採った手段は、中心形バタフライ弁に設けた取付フランジ面に複数の凹部又は凸部を形成し、前記凹部又は凸部と係脱可能に嵌合して中心形バタフライ弁の弁棒の回転方向に位置決め係合作用を行なう凸部又は凹部を有する同一寸法及び構造の取付面をケーシングの上下両面に形成し、該取付面の中心にウォームギヤ軸部孔を形成し、該ウォームギヤ軸部孔に軸支してケーシング内に配置したウォームギヤに弁棒連結孔を上下に貫通して穿孔し、ウォームギヤと噛合するウォームのウォーム軸をケーシング外に延出してその延出端に操作ハンドルを取り付けると共に、前記弁棒連結孔に回転を一体にしつつ中心形バタフライ弁の弁棒を挿脱可能に嵌合させたことを特徴とする。

【0013】又、ケーシングは、中央部分において上部ケーシングと下部ケーシングに2分割され、上部ケーシングと下部ケーシングは同一の形状、寸法を有する浅い皿状の成形体により構成され、接合して箱状のケーシングに構成したことを特徴とする。

【0014】更に、ケーシングに設けた取付面に開閉表示を施す一方、弁開度遠隔指示器を取付面に着脱可能に取り付けたことを特徴とする。

【0015】更に、凹凸嵌合は、弁棒連結孔を中心とする対称位置に配設した複数の凸部と、該凸部にそれぞれ嵌合する複数の凹部により構成され、各組の凹部を弁棒連結孔を中心とする異なる位相位置に設けて、取付フランジ面に対するケーシングの取付位置を選択可能として、操作ハンドルの位置を変更出来るようにしたことを特徴とする。

【0016】更に、中央部分において上部ケーシングと下部ケーシングに2分割され、上下両ケーシングは同一

の形状、寸法を有する浅い皿状の成形体により構成され、接合して1個の箱状のケーシングとなるバタフライ弁の駆動装置のケーシングの製造において、上部ケーシング及び下部ケーシングを上金型と下金型の対からなる1面の金型で成形し、後加工を不要としたことを特徴とする。

【0017】更に、上金型と下金型の接合面を上下ケーシングの接合面となるようにしたことを特徴とする。

【0018】

【実施の形態】以下に図を参照しつつ、この発明の好ましい実施例を詳細に説明する。図において、(1)はこの発明にかかる駆動装置であり、そのケーシング(2)の側面に操作ハンドル(3)が位置づけられている。ケーシング(2)は中央部分から上部ケーシング(2a)と下部ケーシング(2b)に2分割されている。上部ケーシング(2a)と下部ケーシング(2b)は同一形状、寸法の浅い皿状の合成樹脂成形体により構成され、接合されて1個の箱状のケーシング(2)を構成する。

【0019】又、ケーシング(2)の上下両面にはそれぞれ取付面(4a)(4b)を形成している。取付面(4a)(4b)は同一寸法及び構造を有し、各取付面(4a)(4b)の中央にそれぞれウォームギヤ軸部孔(5)を形成すると共に、このウォームギヤ軸部孔(5)を中心とする対称位置に4個のボルト孔(6)と2個の凸部(7)をそれぞれ等間隔に配置して形成する。

【0020】一方、バタフライ弁の弁本体(8)の外周面から直径方向外方に向かって伸び出す弁軸筒(9)の先端に取付フランジ面(10)を設け、該取付フランジ面(10)に前記凸部(7)が嵌合する4個の凹部(11)を等間隔に配置して形成し、凸部(7)を凹部(11)に嵌合させることにより、取付フランジ面(10)に対してケーシング(2)をウォームギヤ軸部孔(5)を中心とする回転方向に位置決め係合させるようにしている。尚、凸部(7)及び凹部(11)をそれぞれ等配形成している為に、ケーシング(2)の取付方向を片面で4方向、上下両面で8方向に変更することにより、操作ハンドル(3)の位置を8方向に設定出来るようにしている。

【0021】又、上記ボルト孔(6)に対応する4個のボルト孔(12)を取付フランジ面(10)に等間隔に形成し、これらのボルト孔(6)(12)に取付フランジ面(10)の下方から挿通したボルト(13)でケーシング(2)を取付フランジ面(10)に締付固定する。(14)はケーシング(2a)(2b)を相互に締付固定するボルトである。

【0022】ケーシング(2)の内部には平面から見て扇形をなすウォームギヤ(15)と、このウォームギヤ(15)に噛合したウォーム(16)を回転自在に配設している。ウォームギヤ(15)の軸中心には前記ウォームギヤ軸部孔(5)に整合して弁棒連結孔(17)が上下に貫通して穿孔されている。

【0023】弁棒連結孔(17)の内周面には、4本のキー

溝(17a)が等間隔に形成され、弁本体(8)に固着した弁棒(18)の先端近傍に埋め込んだキー(18a)をキー溝(17a)に係合させることにより、弁棒(18)をウォームギヤ(15)に回転を一体にして挿脱可能に嵌合させている。ウォーム(16)に固定したウォーム軸(19)の一端はケーシング(2)の外部に延出され、その延出端に操作ハンドル(3)を取り付けている。操作ハンドル(3)を回転操作してウォーム(16)を回転させると、ウォームギヤ(15)を介して弁棒(18)が回転され、弁本体(8)に設けた図示しない弁体が開閉回転操作される。

【0024】弁棒(18)の先端面には弁体の方向と一致するスリット(20)を設け、このスリット(20)に嵌合させた指針(21)を弁棒(18)の先端面に取り付けると共に、開(O)及び閉(S)の表示文字(22)を取付面(4a)(4b)に刻印している。又、弁開度遠隔指示器として機能するリミットスイッチ(23)(24)を取り付けたプレート(25)をボルト孔(6)を利用して取付面(4)に着脱可能に取り付けることにより、弁体が全開位置に回動した時に指針(21)の先端が開(O)を指し示すと共に、開位置に設けたリミットスイッチ(23)が作動され開信号が出力される。又、弁体が全閉位置に回動すると指針(21)の先端が閉(S)を指し示すと共に、閉位置に設けたリミットスイッチ(24)が作動され閉信号が出力される。

【0025】(26)はウォームギヤ軸部孔(5)とケーシング(2a)(2b)の間をシールするパッキン、(27)はウォーム軸(19)とケーシング(2a)(2b)の間をシールするパッキンであり、ガスケット(28)を上下のケーシング(2a)(2b)の接合面の全周に挟み込むことにより、駆動装置(1)を防滴及び防水構造とすると共に、内部からの潤滑油の漏洩防止構造としている。(29)はウォーム(15)の端部の平坦部に当接するストッパボルトであり、ケーシング(2a)(2b)内に形成されたストッパボス部(30)に進退自在に螺挿され、弁体の開閉位置を調整する。

【0026】この発明は、弁本体(8)に形成した取付フランジ面(10)とケーシング(2)の上下両面に形成した取付面(4a)(4b)とを、凸部(7)と凹部(11)による凹凸嵌合で弁棒(18)の回転方向に位置決め係合させてボルト(13)で締付固定している為、ボルト(13)のみではなく、凸部(7)と凹部(11)にも弁の開閉にともなう操作反力を負担させることが出来る。従って、ケーシング(2)及び弁本体(8)等を合成樹脂材料の成形品で構成した場合においても取付面(4)と取付フランジ面(10)の間のズレを的確に防止することが出来る。

【0027】又、弁棒連結孔(17)を中心とする対称位置に凸部(7)を配設し、該凸部(7)が嵌合し得る複数組の凹部(11)を弁棒連結孔(17)を中心とする異なる位相位置に設けている為、凸部(7)と凹部(11)との嵌合の組合せを選択して取付フランジ面(10)におけるケーシング(2)の取付位置を変更出来る。従って、図7に示したように操作ハンドル(3)がパイプラインの右側に位置するよう

にして駆動装置(1)を取り付け、或は図8に示したように駆動装置(1)を天地反転させて取り付け操作ハンドル(3)をパイプラインの左側に位置させることが出来、各取り付け状態においても凹部(11)の組数分だけ駆動装置(1)の取り付け位相を異ならせて操作ハンドル(3)の位置を変更出来る為、現場の状況に応じて操作ハンドル(3)の位置を最適位置に選定することが出来る。

【0028】尚、通常は操作ハンドル(3)を反時計方向に回転操作した場合に弁体が開作動し、時計方向に回転させた場合に弁体が閉作動する。従って、駆動装置(1)を天地反転させた場合は、操作ハンドル(3)の回転方向は同じであるが、弁体の開閉が逆転となる。ところが、この発明では弁体が360°回転する中心形バタフライ弁を採用している。従って、操作ハンドル(3)の回転に伴って弁体が逆方向に回転したとしても所期の開閉動作を行なう為、駆動装置(1)の取り付け方向を変更した場合にも操作ハンドル(3)の操作性の整合性が損なわれるおそれはない。

【0029】上記実施態様では取付面(4a)(4b)に凸部(7)を設けると共に取付フランジ面(10)に凹部(11)を設けているが、凸部と凹部の関係を逆転しても同一の作用効果を得ることが出来る。又、2個の凸部(7)と4個の凹部(11)をそれぞれ等間隔に形成して駆動装置(1)を合計8種の取付態様から選択出来るようにしているが、凸部(7)及び凹部(11)の数は予測される取付態様に依って変更出来る。

【0030】ケーシングの上下両面に設けた取付面は同一寸法及び構造に形成され、各取付面の中心にそれぞれウォームギヤ軸部孔を形成している。又、ケーシング内に回転自在に軸支したウォームギヤに、前記ウォームギヤ軸部孔に整合する弁棒連結孔を上下に貫通させて穿孔し、中心形バタフライ弁の弁棒を弁棒連結孔に挿脱可能に係合させている。従って、ケーシングの上下いずれの取付面を用いても駆動装置をバタフライ弁の弁本体に取り付けることが出来る。又、中心形バタフライ弁は弁棒を正逆いずれの方向に回転させても所期の開閉作用を行なう。よって、天地を反転させて駆動装置を取り付けた場合においても、操作ハンドルを例えば反時計方向に回転させた時に弁体が開き、時計方向に回転させた場合に弁体が閉じるため、全てのバタフライ弁の駆動装置の操作ハンドルの回転方向を統一することが出来る。

【0031】又、弁本体に設けた取付フランジ面とケーシングに設けた取付面を凹凸嵌合により弁棒の回転方向に位置決め係合させるようにしている為、弁本体及びケーシングを合成樹脂材料で構成した場合にも操作ハンドルの操作に伴ってウォームギヤ軸部に作用するトルクは抑制され、駆動装置のケーシングに設けた取付面とバタフライ弁側に設けた取付フランジ面の間にズレが生じない為、弁の開閉位置に誤差が発生せず流体が漏洩することはない。

【0032】更に、ケーシングに設けた取付面に開閉表示を施して弁開度遠隔指示器を取付面に着脱可能に取り付けた場合は、駆動装置の取り付け方向に応じて弁開度遠隔指示器を付け替えることで対処出来る。

【0033】更に又、弁棒連結孔を中心とする対称位置に配設した複数の凸部と、該凸部にそれぞれ嵌合する複数組の凹部により凹凸嵌合を構成し、且各組の凹部を弁棒連結孔を中心とする異なる位相位置に設けた場合は、凸部を嵌合させる凹部を選択してフランジに対するケーシングの取付位相を選択して操作ハンドルの位置を変更出来る為、現場の状況に応じて操作ハンドルの位置を最適位置に選定することが出来る。

【0034】次に、この発明の駆動装置のケーシングの製造方法について説明する。図9、10を参照して、同一の形状を有する上下ケーシング(2a)(2b)は、1面(1対)の金型、即ち上金型(34)と下金型(35)で製造され、接合されて箱状のケーシング(2)に形成される。即ち、この発明のケーシングは、1対の金型のみで上下2個のケーシングを成形するようにしてあるので、従来のケーシング本体と蓋のようにケーシングの組合せを考慮する必要がなくなり、製造が容易となる利点がある。

【0035】成形されたケーシングは樹脂の成形加工であるため、寸法精度や、表面を美麗に成形することが出来、ストッパーボス部(30)のボルト孔と取り付け面(4a)(4b)のボルト孔の後加工を除いて、後加工が不要である。そして、かかる後加工を不要とするために、上下ケーシングを浅い皿状に形成して、金型から製品を抜くときの抜き勾配を最小の勾配で十分のように配慮した。かかる抜き勾配が小さな勾配で済むことは、特にウォームギヤ軸部孔(5)の形成に関して顕著な効果を発揮している。又、ウォーム軸(19)の回転部(31)及びバックイン溝(32)に絶好の抜き勾配を示している。接合ボルト孔(33)は浅い開口でよく、取付面(4)の複数の凸部(7)は高さ寸法が少ないため抜き勾配をほとんど考慮する必要がない。その他の部位は、他の部品との接合や摺動の関係がないため、抜き勾配とは無関係である。

【0036】上下金型(34)(35)は、段違いの噛み合わせから成る芯出し部(36)により、横方向の移動を防止されている。上下ケーシング(2a)(2b)の接合面並びにウォームギヤ(15)との接触面は、上金型(34)と下金型(35)の接合面(37)に当たり、両金型の面粗度によりその精度が左右される。成形後、ウォーム軸(19)の操作ハンドルが取り付けられない方向は、硬質ゴムや樹脂等からなるプラグ(42)で閉塞される。ケーシングリブ(38)は、ボルト孔(6)が形成される部位であり、他の部位より肉厚にする必要があると共に、ケーシングの構造を補強する観点からその形状、厚みが決定される。

【0037】図9を参照して、上方の主導入溝(39)から環状溝(40)、導入溝(41)を経てケーシングに注湯される。導入溝の大きさ、及び数は、ケーシングの形状、寸

法並びに成形材料により適宜選択される。注湯と同時に金型空洞部(キャビティ)の排気が行われる。成形材料の種類により、注入速度、圧力、温度等は異なる。成形材料としての合成樹脂材料は、ポリエチレン、ポリプロピレン等の熱可塑性樹脂或いはエポキシ、メラミン等の熱硬化性樹脂が好ましい。又、ガラス繊維や炭素繊維を混合して強度を向上することもできる。成形後は、主導入溝(39)、導入溝(41)を切除してケーシングを取り出す。主導入溝(39)や導入溝(41)の切除箇所は、仕上げ工数の削減、仕上げ面の美麗さの関係から、可能な限り少なく、かつ小さな断面とするのが好ましい。

【0038】

【発明の効果】この発明のバタフライ弁の駆動装置によれば、以下の如き効果を奏することが出来る。

【0039】1. 駆動装置のケーシングの上下両面に同一寸法及び構造の取付面を形成してバタフライ弁の配管設置後においても必要に応じて駆動装置を天地反転させて取り付け操作ハンドルの位置を変更出来るようにしている為、操作ハンドルの回転方向を統一することが出来、弁の開閉操作性が向上すると共に、緊急時の迅速性及び安全性が高くなる。

【0040】2. バタフライ弁の弁本体に設けた取付フランジ面と駆動装置のケーシングに設けた取付面を複数の凹凸嵌合により弁棒の回転方向に位置決め係合させている為、操作ハンドルの操作に伴ってウォームギヤ軸部に作用するトルクは抑制され取付フランジ面と取付面の間のズレを回避でき、弁本体及びケーシングを合成樹脂材料で構成した場合にも駆動装置のケーシングに設けた取付面とバタフライ弁側に設けた取付フランジ面の間にズレが生じることがなく、弁の開位置の誤差による流体の漏洩を防止出来る。

【0041】3. 操作ハンドルの位置を変更した場合にも開閉表示を新規に設ける必要性がなく、しかも、弁開度遠隔指示器をケーシングの上下いずれの取付面にも取り付けることが出来る為、駆動装置の取り付け方向の変更に伴って弁開度遠隔指示器の取付部を新規に設けることなく対処出来る。

【0042】4. バタフライ弁の配管設置後においても駆動装置の取付位相を変更して操作ハンドルの位置を変更出来る為、現場の状況に対応した最適ハンドル位置を選定出来る。

【0043】5. 上下のケーシングの形状寸法が同一であるので、成型用金型が1面で済み、かつ比較的浅い皿状に形成されているので、成形方案が容易であり金型費用を削減できる。

【0045】6. 上下のケーシングを兼用可能であるため、量産が出来成形金型の準備、取付、保管等の工数削減が出来、合成樹脂又は軽合金等の成形体であるため品質が安定し、外観が美麗で軽量化が可能であるため、女子従業員にも取扱が出来るメリットがある。

【0047】7. 上下のケーシングはほとんど後加工が不要であり、2個のケーシングを接合して1個のケーシングを完成できるため、品質、コスト、納期、サービスの向上を図ることが可能で、且8種類の方向の多様性も有している。

【図面の簡単な説明】

【図1】この発明にかかる駆動装置の一実施例を示す平面図

【図2】図1の底面図

【図3】図1の内部機構を示す平面図

【図4】図3のA-A断面図

【図5】開閉表示及び弁開度遠隔指示器を取りつけた駆動装置の平面図

【図6】この発明にかかる駆動装置が適用されるバタフライ弁の弁本体の上部の斜視図

【図7】パイプラインへの一取付態様を示す平面図

【図8】パイプラインへの異なる取付態様を示す平面図

【図9】ケーシング製造方案を示す平面図

【図10】ケーシング製造方案を示す断面図

【図11】従来の駆動装置のパイプラインへの一取付態様を示す平面図

【図12】従来の駆動装置のパイプラインへの異なる取付態様を示す平面図

【図13】従来の駆動装置のパイプラインへの別の取付態様を示す平面図

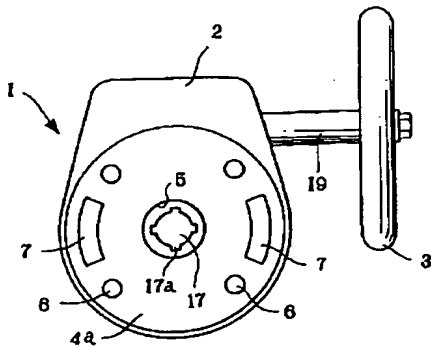
【符号の説明】

- (1) 駆動装置
- (2) ケーシング
- (2a) 上部ケーシング
- (2b) 下部ケーシング
- (3) 操作ハンドル
- (4a)(4b) 取付面
- (5) ウォームギヤ軸部孔
- (6) ボルト孔
- (7) 凸部

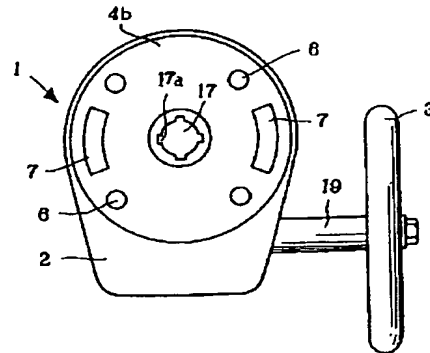
- \* (8) 弁本体
- (9) 弁軸筒
- (10) 取付フランジ面
- (11) 凹部
- (12) ボルト孔
- (13)(14) ボルト
- (15) ウォームギヤ
- (16) ウォーム
- (17) 弁棒連結孔
- 10 (17a) キー溝
- (18) 弁棒
- (18a) 植え込みキー
- (19) ウォーム軸
- (20) スリット
- (21) 指針
- (22) 表示文字
- (23)(24) リミットスイッチ(弁開度遠隔指示器)
- (25) プレート
- (26)(27) バッキン
- 20 (28) ガasket
- (29) ストップボルト
- (30) ストッパーボス部
- (31) ウォーム軸の回転部
- (32) バッキン溝
- (33) 接合ボルト孔
- (34) 上金型
- (35) 下金型
- (36) 芯出し部
- (37) 金型接合面
- 30 (38) ケーシングリブ
- (39) 主導入溝
- (40) 環状溝
- (41) 導入溝
- (42) プラグ

\*

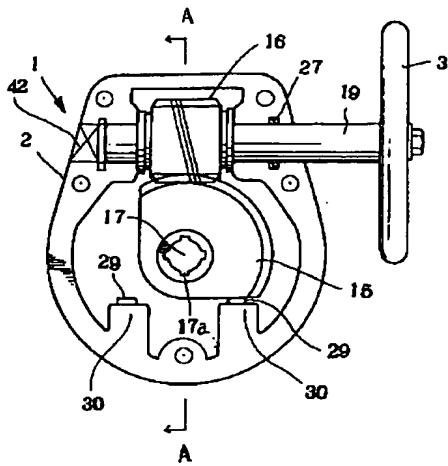
【図1】



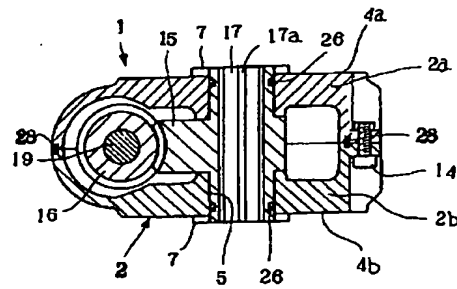
【図2】



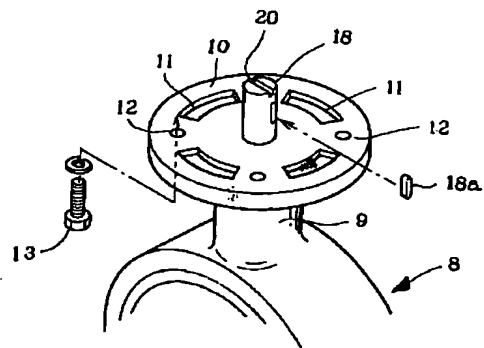
【図3】



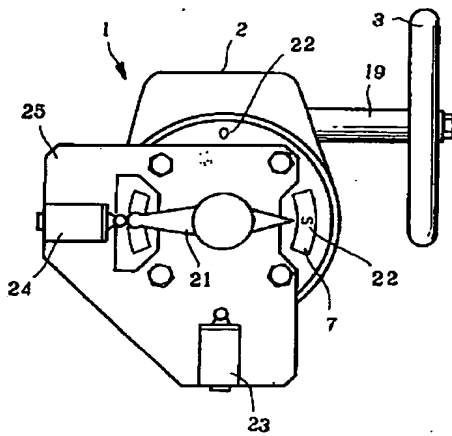
【図4】



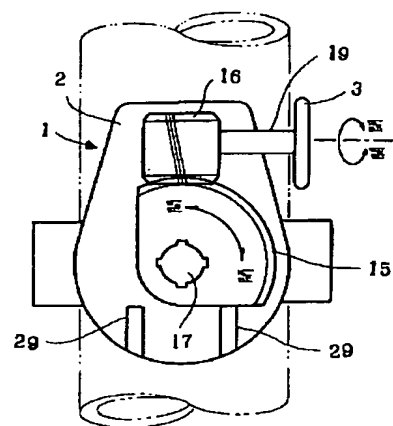
【図6】



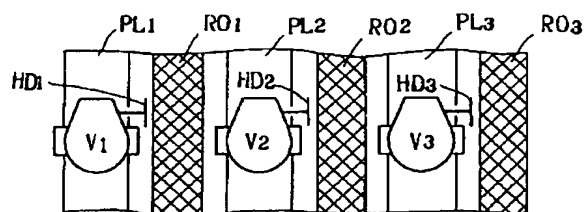
【図5】



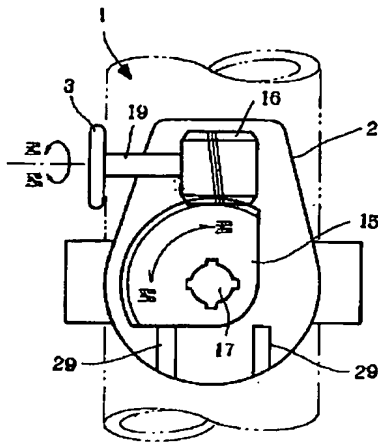
【図7】



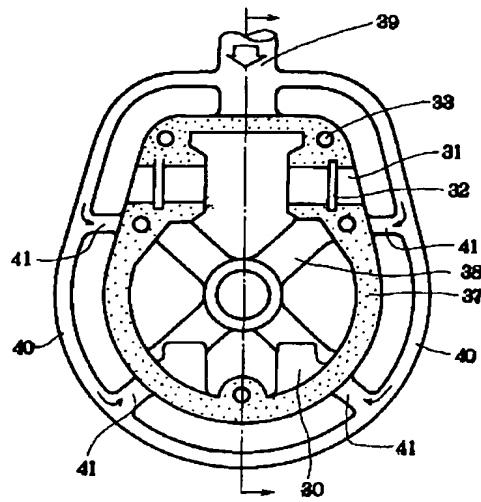
【図11】



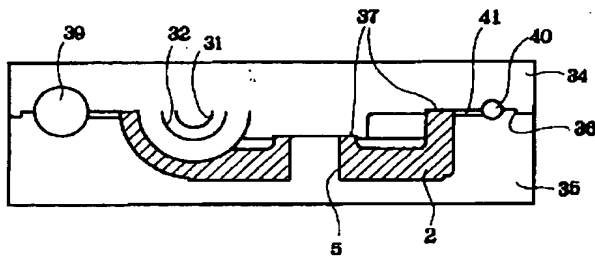
【図8】



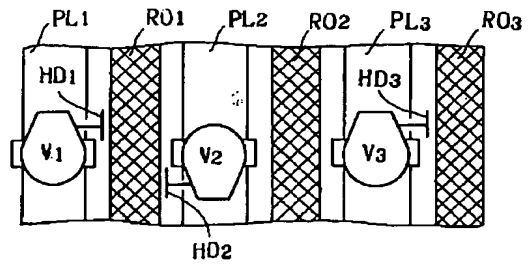
【図9】



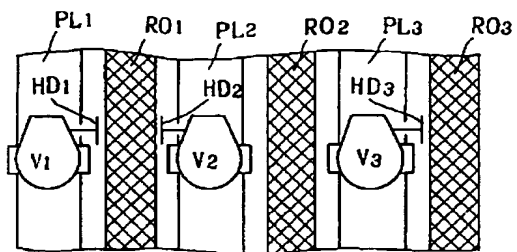
【図10】



【図12】



【図13】





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実公 昭61-46309 (J P, Y2)

(58)調査した分野(Int.Cl.<sup>7</sup>, DB名)

F16K 1/16 - 1/226

F16K 27/02

F16K 31/53

\* NOTICES \*

Registration No. 3090420

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3. In the drawings, any words are not translated.

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## CLAIMS

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### (57) [Claim(s)]

[Claim 1] Two or more crevices or heights are formed in the mounting flange face established in the main form butterfly valve. The clamp face of the same dimension and structure of having the heights or the crevice which fits in possible [ said crevice or heights, and engaging and releasing ], and performs a positioning engagement operation to the hand of cut of the valve rod of a main form butterfly valve is formed in vertical both sides of casing. Penetrate valve rod communicating pore to the worm gearing which formed the worm-gearing shank hole in the core of this clamp face, supported to revolve to this worm-gearing shank hole, and has been arranged in casing up and down, and it is punched. The driving gear of the butterfly valve characterized by making possible fitting of the insertion and detachment of the valve rod of a main form butterfly valve, carrying out a revolution to said valve rod communicating pore at one while extending the worm shaft of the worm which gears with a worm gearing out of casing and attaching an actuation handle in the extension edge.

[Claim 2] Casing is the driving gear of the butterfly valve according to claim 1 characterized by having carried out 2 \*\*\*\*s to a casing-upper half and casing lower half in a part for a center section, for a casing-upper half and casing lower half having been constituted by the shallow dished Plastic solid which has the same configuration and a dimension, having joined, and constituting in box-like casing.

[Claim 3] The driving gear of the butterfly valve according to claim 1 or 2 characterized by attaching a telemeter in a clamp face removable whenever [ valve-opening ] while performing a closing motion display to the clamp face established in casing.

[Claim 4] Concavo-convex fitting is the driving gear of the butterfly valve according to claim 1, 2, or 3 which is constituted by two or more heights arranged in the position of symmetry centering on valve rod communicating pore, and two or more sets of crevices which fit into these heights, respectively, establishes the crevice of each class in a different phase location centering on valve rod communicating pore, makes selectable the attaching position of casing to a mounting flange face, and is characterized by enabling it to change the location of an actuation handle.

[Claim 5] It is the manufacture approach of the driving gear of the butterfly valve characterized by to have fabricated a casing-upper half and casing lower half with the metal mold of the 1st page which consists of a pair of top metal mold and the Shimokane mold in manufacture of casing of the driving gear of the butterfly valve which is made into a casing-upper half and casing lower half 2 \*\*\*\*s in a part for a center section, vertical both casing is constituted by the shallow dished Plastic solid which has the same configuration and a dimension, joins, and becomes one box-like casing, and to make post processing unnecessary.

[Claim 6] The manufacture approach according to claim 5 characterized by making the plane of composition of top metal mold and the Shimokane mold become the plane of composition of vertical casing.

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[Translation done.]

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the possible driving gear and its manufacture approach of making it after modification of a location not change the rotation direction of an actuation handle while enabling modification of the location of an actuation handle to arbitration, without disassembling a driving gear about the driving gear of a main form butterfly valve after attaching to piping.

[0002]

[Description of the Prior Art] The main form butterfly valve which arranged the valve rod on the center of rotation of a valve element is conventionally well-known, and is widely used for control of various fluids. The rotation of a valve element which brings about closing motion of this butterfly valve has the most common method that attaches and drives a handle to the worm shaft of the worm which the end of the valve rod which supports a valve element to revolve is made to extend to the exterior of a valve body, connects a worm gearing with the extension edge of this valve rod, and gears with this worm gearing as the approach of manual operation.

[0003] When arranging the butterfly valve equipped with the driving gear of such a manual operation method in a comparatively generous tooth space at a piping system, especially a big problem is not produced on actuation. However, when two or more butterfly valves are arranged by many pipelines and switching operation is needed for them for every butterfly valve like [ it is narrow like the engine room of a marine vessel, and ] the tooth space in which the device of \*\*\*\*\* carries out congestion and is arranged, and a plant, a big difference arises in working capacity according to the arrangement location of a valve, the location of an actuation handle, the rotation direction, etc.

[0004] The butterfly valves V1-V3 to which two or more pipelines PL1-PL3 were piped by parallel, and drawing 11 equipped each pipelines PL1-PL3 with the driving gear, respectively are attached. The condition that the paths RO1-RO3 where an operator goes in and out among each pipelines PL1-PL3 for actuation are allotted is shown, and the actuation handles HD1-HD3 are beginning to be extended in the same direction to the driving gear of each butterfly valves V1-V3. Therefore, in order to have carried out switching operation of each butterfly valves V1-V3 in this case, the operator had to do the sequential receipts and payments of the three paths RO1-RO3, and had to operate the actuation handles HD1-HD3 according to the individual, and working capacity was bad.

[0005] Then, as shown in drawing 12, as switching operation of two butterfly valves V1 and V2 can be performed at the 1st path RO1, it becomes possible to omit the tooth space for the 2nd path RO2 by once removing, rotating 180 degrees and attaching the 2nd butterfly valve V2 which adjoins the 1st butterfly valve V1 from the pipe rye PL 2, with a driving gear. However, the location of the actuation handles HD1 and HD2 does not align in this case, but there is nonconformity that operability and an appearance are bad. Moreover, drawing 13 makes the worm shaft of the disclosure to JP,61-46309,Y extend from casing of a driving gear to a longitudinal direction, according to the structure which enabled it to attach an actuation handle in the ends of a worm shaft selectively, the actuation handles HD1-HD3 are aligned, and operability and appearance nature improve rather than the case of drawing 12.

[0006] However, since the direction of switching operation of the 1st butterfly valve V1 and the 2nd butterfly valve V2 became reverse in the case of drawing 13, there was a possibility of mistaking the actuation direction and it was not desirable from the point of the quick nature in working capacity and emergency, and safety. With this, the 2nd butterfly valve V2 will rotate an actuation handle towards reverse, and a valve will usually be opened [ that is, / although opening when the rotation direction of a valve is closed when an actuation handle is rotated counterclockwise, and it is clockwise rotated by Japanese Industrial Standards is specified / in the case of drawing 13 ] and closed.

[0007] Furthermore, when casing of a driving gear, the valve body of a butterfly valve, etc. are constituted from a synthetic-resin ingredient etc., in order to rotate the valve element connected with the valve rod by the revolution of an actuation handle through the worm and the worm gearing, big torque arises in a worm-gearing shank, gap occurs between the clamp face established in casing of a driving gear by this torque, and the mounting flange face established in the butterfly-valve side, deviation arises in the closing-motion location of a valve, and it becomes the cause of leakage of a fluid.

[0008] Moreover, when the location of an actuation handle was changed, there was the need of also exchanging the closing motion display means of a valve in connection with this, and in order to change a telemeter whenever [ valve-opening ], there was the need of establishing a mounting hole etc. in the top face of casing newly.

[0009] Moreover, the former to a driving gear consists of casing and a lid, combines these and is unifying as shown in JP,7-12786,Y. That is, the configuration differs from the dimension, and casing and a lid are fabricated with respectively separate metal mold, are machined, and are combined. For this reason, when changing the location of an actuation handle into hard flow, casing and a lid were separated, and an internal worm gearing and an internal worm shaft once had to be taken out, and it had to rearrange in the predetermined direction, and was not desirable from the point of the quick nature in activity manday and emergency. This conventional driving gear mainly had many casts, such as cast iron, and working capacity and an appearance (casting surface) needed to form all of a bond part, the sliding section, a bolthole, etc. by machining preferably with the

configuration of casing and a lid.

[0010]

[Problem(s) to be Solved by the Invention] This invention uses as an offer plug the driving gear of the butterfly valve which the directivity of an actuation handle is aligned and loses the useless motion at the time of actuation, make it raise workability, and the hand of cut of the actuation handle for \*\*\*\*\* is made in agreement, abolishes a failure, and can make high the quick nature and the safety in emergency while it is orderly and it enables arrangement of a driving gear at a butterfly-valve list also in the part which a narrow tooth space or narrow piping, and a device are \*\*\*\*\*(ing).

[0011] Moreover, can mass-produce at the time of manufacture of a driving gear, the cutback of manday and quality are stabilized, and an appearance is beautiful. While work environment can attain the objects, such as being good, enables shaping of casing and a lid for what has the required metal mold, casing and a lid, of the 2nd page with the metal mold of the 1st page conventionally and being able to aim at the cutback of metal mold costs It fabricates to dished [ shallow ] and a shaping casting plan is made easy, and the cutback of shaping costs can be aimed at, and moreover it is necessary to hardly carry out post processing of the casing of vertical combination, and let the manufacture approach which can be manufactured be an offer plug.

[0012]

[Means for Solving the Problem] The means which this invention took in order to solve the above-mentioned technical problem Two or more crevices or heights are formed in the mounting flange face established in the main form butterfly valve. The clamp face of the same dimension and structure of having the heights or the crevice which fits in possible [ said crevice or heights, and engaging and releasing ], and performs a positioning engagement operation to the hand of cut of the valve rod of a main form butterfly valve is formed in vertical both sides of casing. Penetrate valve rod communicating pore to the worm gearing which formed the worm-gearing shank hole in the core of this clamp face, supported to revolve to this worm-gearing shank hole, and has been arranged in casing up and down, and it is punched. While extending the worm shaft of the worm which gears with a worm gearing out of casing and attaching an actuation handle in the extension edge, it is characterized by making possible fitting of the insertion and detachment of the valve rod of a main form butterfly valve, carrying out a revolution to said valve rod communicating pore at one.

[0013] Moreover, 2 \*\*\*\*\* of casing are made into a casing-upper half and casing lower half in a part for a center section, and it is characterized by for a casing-upper half and casing lower half having been constituted by the shallow dished Plastic solid which has the same configuration and a dimension, and having joined and constituting them in box-like casing.

[0014] Furthermore, while performing a closing motion display to the clamp face established in casing, it is characterized by attaching a telemeter in a clamp face removable whenever [ valve-opening ].

[0015] Furthermore, concavo-convex fitting is constituted by two or more heights arranged in the position of symmetry centering on valve rod communicating pore, and two or more sets of crevices which fit into these heights, respectively, establishes the crevice of each class in a different phase location centering on valve rod communicating pore, makes selectable the attaching position of casing to a mounting flange face, and is characterized by enabling it to change the location of an actuation handle.

[0016] Furthermore, in a part for a center section, 2 \*\*\*\*\* is carried out to a casing-upper half and casing lower half, and vertical both casing is constituted by the shallow dished Plastic solid which has the same configuration and a dimension, a casing-upper half and casing lower half are fabricated with the metal mold of the 1st page which consists of a pair of top metal mold and the Shimokane mold in manufacture of casing of the driving gear of the butterfly valve which joins and becomes one box-like casing, and it is characterized by making post processing unnecessary.

[0017] Furthermore, it is characterized by making the plane of composition of top metal mold and the Shimokane mold become the plane of composition of vertical casing.

[0018]

[Embodiment of the Invention] The desirable example of this invention is explained to a detail, referring to drawing below. In drawing, (1) is a driving gear concerning this invention, and the actuation handle (3) is positioned in one side face of that casing (2). Two \*\*\*\*\* (2) of casing are made into a casing-upper half (2a) and casing lower half (2b) from a part for a center section. A casing-upper half (2a) and casing lower half (2b) are constituted by the dished synthetic-resin Plastic solid with shallow same configuration and dimension, and it is joined and they constitute one box-like casing (2).

[0019] Moreover, the clamp face (4a) (4b) is formed in vertical both sides of casing (2), respectively. A clamp face (4a) (4b) arranges and forms four boltholes (6) and two heights (7) in the position of symmetry centering on this worm-gearing shank hole (5) at equal intervals, respectively while it has the same dimension and structure and forms a worm-gearing shank hole (5) in the center of each clamp face (4a) (4b), respectively.

[0020] On the other hand, a mounting flange face (10) is established at the head of the valve shaft tube (9) which begins to be extended toward the method of the outside of the diameter direction from the peripheral face of the valve body (8) of a butterfly valve. By arranging and forming in this mounting flange face (10) four crevices (11) into which said heights (7) fit at equal intervals, and making a crevice (11) carry out fitting of the heights (7) He is trying to make the hand of cut centering on a worm-gearing shank hole (5) carry out positioning engagement of the casing (2) to a mounting flange face (10). In addition, since heights (7) and a crevice (11) are \*\*\*\*\* (ed) [ each ], it enables it to set up the location of an actuation handle (3) in the eight directions by changing in the four directions on one side, and changing the mounting direction of casing (2) in the eight directions by vertical both sides.

[0021] Moreover, four boltholes (12) corresponding to the above-mentioned bolthole (6) are formed in a mounting flange face (10) at equal intervals, and casing (2) is fixed to a mounting flange face (10) with a bundle with the bolt (13) inserted in these boltholes (6) and (12) from the lower part of a mounting flange face (10). (14) is a bolt which fixes casing (2a) (2b) mutually with a bundle.

[0022] The worm (16) which geared to the worm gearing (15) which sees from a flat surface inside casing (2), and makes a sector, and this worm gearing (15) is arranged enabling a free revolution. It has consistency in said worm-gearing shank hole (5) in the shaft center of a worm gearing (15), and valve rod communicating pore (17) penetrates up and down, and is punched.

[0023] Four key ways (17a) are formed at equal intervals, by making the key (18a) embedded near the head of the valve rod (18)

which fixed on the valve body (8) engage a key way (17a), a valve rod (18) is made as worm gearing (15), a revolution is made into one, and fitting of the insertion and detachment is made possible to the inner skin of valve rod communicating pore (17). The end of the worm shaft (19) fixed to the worm (16) extended to the exterior of casing (2), and has attached the actuation handle (3) in the extension edge. If revolution actuation of the actuation handle (3) is carried out and a worm (16) is rotated, a valve rod (18) will rotate through a worm gearing (15), and closing motion revolution actuation of the valve element which was prepared in the valve body (8) and which is not illustrated will be carried out.

[0024] The slit (20) which is in agreement with the direction of a valve element was prepared in the apical surface of a valve rod (18), and while attaching in the apical surface of a valve rod (18) the guide (21) which carried out fitting to this slit (20), the open (O) and close (S) graphic character (22) is stamped on the clamp face (4a) (4b). Moreover, when a valve element rotates to an open position by attaching in a clamp face (4) the plate (25) which attached the limit switch (23) which functions as a telemeter whenever [ valve-opening ], and (24) removable using a bolthole (6), while the head of a guide (21) points to open (O), the limit switch (23) formed in the open position operates, and an open signal is outputted. Moreover, when a valve element rotates to a closed position, while the head of a guide (21) points to close (S), the limit switch (24) formed in the closed position operates, and a close signal is outputted.

[0025] Packing with which (26) carries out the seal of between a worm-gearing shank hole (5) and casing (2a) (2b), By (27) being packing which carries out the seal of between a worm shaft (19) and casing (2a) (2b), and putting a gasket (28) between the perimeter of the plane of composition of up-and-down casing (2a) (2b) While making a driving gear (1) into dripproof and waterproof construction, it is considering as the leakage control structure of the lubricating oil from the interior. (29) is a stopper bolt which contacts the flat part of the edge of a worm (15), is screwed in free [ an attitude ] by the stopper boss section (30) formed in casing (2a) (2b), and adjusts the closing motion location of a valve element.

[0026] This invention the mounting flange face (10) formed in the valve body (8), and the clamp face (4a) (4b) formed in vertical both sides of casing (2) Since the hand of cut of a valve rod (18) is made to carry out positioning engagement by concavo-convex fitting by heights (7) and the crevice (11) and it is fixing with a bundle with the bolt (13), not only a bolt (13) but heights (7) and a crevice (11) can be made to pay the actuation reaction force accompanying closing motion of a valve. Therefore, when casing (2), a valve body (8), etc. are constituted from mold goods of a synthetic-resin ingredient, gap between a clamp face (4) and a mounting flange face (10) can be prevented exactly.

[0027] Moreover, heights (7) are arranged in the position of symmetry centering on valve rod communicating pore (17), since two or more sets of crevices (11) into which these heights (7) can fit are established in a different phase location centering on valve rod communicating pore (17), the combination of fitting of heights (7) and a crevice (11) is chosen, and the attaching position of casing (2) in a mounting flange face (10) can be changed. Therefore, as shown in drawing 7, as an actuation handle (3) is located in a pipeline's right-hand side, it attaches a driving gear (1). Or as shown in drawing 8, top-and-bottom reversal can be carried out, a driving gear (1) can be attached, and an actuation handle (3) can be located in a pipeline's left-hand side. Since the installation phase of a driving gear (1) is changed by the number of groups of a crevice (11) also in each installation condition and the location of an actuation handle (3) can be changed, according to the situation of a site, the location of an actuation handle (3) can be selected in the optimal location.

[0028] In addition, when revolution actuation of the actuation handle (3) is usually carried out counterclockwise, a valve element carries out open actuation, and when it is made to rotate clockwise, a valve element carries out close actuation. Therefore, although the hand of cut of an actuation handle (3) is the same when top-and-bottom reversal of the driving gear (1) is carried out, closing motion of a valve element is reversed. However, in this invention, the valve element has adopted the main form butterfly valve rotated 360 degrees. Therefore, even if a valve element rotates to hard flow with the revolution of an actuation handle (3), in order to perform an expected switching action, also when the installation direction of a driving gear (1) is changed, there is no possibility that the consistency of the operability of an actuation handle (3) may be spoiled.

[0029] In the above-mentioned embodiment, while preparing heights (7) in a clamp face (4a) (4b), the crevice (11) is established in the mounting flange face (10), but even if it reverses the relation between heights and a crevice, the same operation effectiveness can be acquired. Moreover, although two heights (7) and four crevices (11) are formed at equal intervals, respectively and it enables it to choose a driving gear (1) from a total of eight sorts of mounting modes, the number of heights (7) and crevices (11) can be changed according to the mounting mode predicted.

[0030] The clamp face established in vertical both sides of casing is formed in the same dimension and structure, and forms the worm-gearing shank hole in the core of each clamp face, respectively. Moreover, the worm gearing supported to revolve free [ a revolution ] is made to penetrate the valve rod communicating pore adjusted in said worm-gearing shank hole up and down, and is punched, and the valve rod of a main form butterfly valve is made engaged possible [ insertion and detachment ] in casing at valve rod communicating pore. therefore, the upper and lower sides of casing — a driving gear can be attached in the valve body of a butterfly valve even if it uses which clamp face. moreover, a main form butterfly valve — a valve rod — forward — reverse — even if it makes it rotate in which direction, an expected closing motion operation is performed. Therefore, since a valve element closes, and a valve element closes when it is made to rotate clockwise, an aperture and when top and bottom are reversed, a driving gear is attached and an actuation handle is rotated counterclockwise, the hand of cut of the actuation handle of the driving gear of all butterfly valves can be unified.

[0031] Moreover, since he is trying to make the hand of cut of a valve rod carry out positioning engagement of the mounting flange face established in the valve body, and the clamp face established in casing by concavo-convex fitting, The torque which acts on a worm-gearing shank with actuation of an actuation handle also when a valve body and casing are constituted from a synthetic-resin ingredient is controlled. Since gap does not arise between the clamp face established in casing of a driving gear, and the mounting flange face established in the butterfly-valve side, an error does not occur in the closed position of a valve and a fluid is not revealed.

[0032] Furthermore, when a closing motion display is performed to the clamp face established in casing and a telemeter is attached in a clamp face removable whenever [ valve-opening ], it can be coped with by changing a telemeter whenever [ valve-opening ] according to the installation direction of a driving gear.

[0033] Furthermore, two or more heights arranged in the position of symmetry centering on valve rod communicating pore again,

When two or more sets of crevices which into these heights, respectively constitute convex fitting and the crevice of \*\*\*\*\* is established in a different phase location centering on valve rod communicating pore. Since the crevice which carries out fitting of the heights is chosen, the mounting phase of casing to a flange is chosen and the location of an actuation handle can be changed, according to the situation of a site, the location of an actuation handle can be selected in the optimal location. [0034] Next, the manufacture approach of casing of the driving gear this invention is explained. With reference to drawing 9 and 10, it is manufactured and joined with the metal mold of the 1st page (one pair), i.e., top metal mold, (34), and the Shimokane mold (35), and vertical casing (2a) (2b) which has the same configuration is formed in box-like casing (2). That is, since casing of this invention has fabricated casing of two upper and lower sides only with one pair of metal mold, it has the advantage from which it becomes unnecessary to take the combination of casing into consideration like the conventional casing main body and a lid, and manufacture becomes easy.

[0035] Since fabricated casing is the fabricating operation of resin, it can fabricate dimensional accuracy and a front face beautiful, and its post processing is unnecessary except for post processing of the bolthole of the stopper boss section (30), and the bolthole of the clamp face (4a) (4b). And in order to make this post processing unnecessary, vertical casing was formed in dished [ shallow ], and the draft when extracting a product from metal mold was considered so that fully [ the minimum inclination ]. Ending with inclination with this small draft demonstrates remarkable effectiveness about formation of a worm-gearing shank hole (5) especially. Moreover, the best draft is shown in the revolution section (31) and the packing groove (32) of a worm shaft (19). Shallow opening is sufficient as a junction bolthole (33), and since there are few height dimensions, two or more heights (7) of a clamp face (4) hardly need to take the draft into consideration. Since other parts have neither junction on other components, nor the relation of sliding, draft's are unrelated.

[0036] A up Shimokane mold (34) and (35) are having lateral migration prevented by the alignment section (36) which consists of tabling in a completely different class. As for the contact surface with a worm gearing (15), the precision is influenced by the plane-of-composition list of vertical casing (2a) (2b) with the field relative roughness of both metal mold in the plane of composition (37) of top metal mold (34) and the Shimokane mold (35). The direction in which the actuation handle of a worm shaft (19) is not attached is blockaded after shaping with the plug (42) which consists of hard rubber, resin, etc. A casing rib (38) is a part in which a bolthole (6) is formed, and while making it thickness from other parts, the configuration and thickness are determined from a viewpoint which reinforces the structure of casing.

[0037] With reference to drawing 9, teeming is carried out to casing through a circular sulcus (40) and an introductory slot (41) from an upper initiative ON slot (39). The magnitude of an introductory slot and a number are suitably chosen as the configuration of casing, and a dimension list with a molding material. Exhaust air of the metal mold cavernous section (cavity) is performed to teeming and coincidence. Grouting velocity, a pressure, temperature, etc. change with classes of molding material. The synthetic-resin ingredient as a molding material has desirable thermosetting resin, such as thermoplastics, such as polyethylene and polypropylene, or epoxy, and a melamine. Moreover, a glass fiber and a carbon fiber can be mixed and reinforcement can also be improved. After shaping excises an initiative ON slot (39) and an introductory slot (41), and takes out casing. As for the excision part of an initiative ON slot (39) and an introductory slot (41), it is desirable to consider as a small cross section from the relation of a machined surface the cutback of finishing manday and beautiful as few as possible.

[0038]

[Effect of the Invention] According to the driving gear of the butterfly valve of this invention, the effectiveness like a less or equal can be done so.

[0039] 1. Since the clamp face of the same dimension and structure is formed in vertical both sides of casing of a driving gear, and top-and-bottom reversal is carried out, a driving gear is attached if needed and it enables it to change the location of an actuation handle after piping installation of a butterfly valve, while the hand of cut of an actuation handle can be unified and the closing motion operability of a valve improves, the quick nature and the safety in emergency become high.

[0040] 2. Since Hand of Cut of Valve Rod is Made to Carry Out Positioning Engagement of Mounting Flange Face Established in Valve Body of Butterfly Valve, and Clamp Face Established in Casing of Driving Gear by Two or More Concavo-convex Fitting, The torque which acts on a worm-gearing shank with actuation of an actuation handle is controlled, and gap between a mounting flange face and a clamp face can be avoided. Also when a valve body and casing are constituted from a synthetic-resin ingredient, gap does not arise between the clamp face established in casing of a driving gear, and the mounting flange face established in the butterfly-valve side, and leakage of the fluid by the error of the closed position of a valve can be prevented.

[0041] 3. the need of preparing a closing motion display newly also when the location of an actuation handle is changed — there is nothing — moreover — whenever [ valve-opening ] — a telemeter — the upper and lower sides of casing — since it can attach in any clamp face, it can be coped with, without preparing the mounting section of a telemeter newly whenever [ valve-opening ] with modification of the installation direction of a driving gear.

[0042] 4. Since the mounting phase of a driving gear is changed and the location of an actuation handle can be changed after piping installation of a butterfly valve, the optimal handle position corresponding to the situation of a site can be selected.

[0043] 5. since the geometry of up-and-down casing is the same — molding — public funds — since a mold can be managed with the 1st page and it is formed in dished [ comparatively shallow ], a shaping casting plan is easy and can reduce metal mold costs.

[0045] 6. Since up-and-down casing can be made to serve a double purpose, mass production is made, the manday cutback of preparation of shaping metal mold, mounting, storage, etc. can be performed, since it is the Plastic solid of synthetic resin or a light alloy, quality is stabilized, an appearance is beautiful, and since lightweight-izing is possible, there is a merit a woman employee can also do handling.

[0047] 7. Most up-and-down casing has unnecessary post processing, it is possible to aim at improvement in quality, cost, a delivery date, and service, since two casing is joined and one casing can be completed, and it also has the versatility of the direction of eight kinds of \*\*.

[Translation done.]

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TECHNICAL FIELD

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[Field of the Invention] Especially this invention relates to the possible driving gear and its manufacture approach of making it after modification of a location not change the rotation direction of an actuation handle while enabling modification of the location of an actuation handle to arbitration, without disassembling a driving gear about the driving gear of a main form butterfly valve after attaching to piping.

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## PRIOR ART

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[Description of the Prior Art] The main form butterfly valve which arranged the valve rod on the center of rotation of a valve element is conventionally well-known, and is widely used for control of various fluids. The rotation of a valve element which brings about closing motion of this butterfly valve has the most common method that attaches and drives a handle to the worm shaft of the worm which the end of the valve rod which supports a valve element to revolve is made to extend to the exterior of a valve body, connects a worm gearing with the extension edge of this valve rod, and gears with this worm gearing as the approach of manual operation.

[0003] When arranging the butterfly valve equipped with the driving gear of such a manual operation method in a comparatively generous tooth space at a piping system, especially a big problem is not produced on actuation. However, when two or more butterfly valves are arranged by many pipelines and switching operation is needed for them for every butterfly valve like [ it is narrow like the engine room of a marine vessel, and ] the tooth space in which the device of \*\*\*\*\* carries out congestion and is arranged, and a plant, a big difference arises in working capacity according to the arrangement location of a valve, the location of an actuation handle, the rotation direction, etc.

[0004] The butterfly valves V1-V3 to which two or more pipelines PL1-PL3 were piped by parallel, and drawing 11 equipped each pipelines PL1-PL3 with the driving gear, respectively are attached. The condition that the paths RO1-RO3 where an operator goes in and out among each pipelines PL1-PL3 for actuation are allotted is shown, and the actuation handles HD1-HD3 are beginning to be extended in the same direction to the driving gear of each butterfly valves V1-V3. Therefore, in order to have carried out switching operation of each butterfly valves V1-V3 in this case, the operator had to do the sequential receipts and payments of the three paths RO1-RO3, and had to operate the actuation handles HD1-HD3 according to the individual, and working capacity was bad.

[0005] Then, as shown in drawing 12, as switching operation of two butterfly valves V1 and V2 can be performed at the 1st path RO1, it becomes possible to omit the tooth space for the 2nd path RO2 by once removing, rotating 180 degrees and attaching the 2nd butterfly valve V2 which adjoins the 1st butterfly valve V1 from the pipe rye PL 2, with a driving gear. However, the location of the actuation handles HD1 and HD2 does not align in this case, but there is nonconformity that operability and an appearance are bad. Moreover, drawing 13 makes the worm shaft of the disclosure to JP,61-46309,Y extend from casing of a driving gear to a longitudinal direction, according to the structure which enabled it to attach an actuation handle in the ends of a worm shaft selectively, the actuation handles HD1-HD3 are aligned, and operability and appearance nature improve rather than the case of drawing 12.

[0006] However, since the direction of switching operation of the 1st butterfly valve V1 and the 2nd butterfly valve V2 became reverse in the case of drawing 13, there was a possibility of mistaking the actuation direction and it was not desirable from the point of the quick nature in working capacity and emergency, and safety. With this, the 2nd butterfly valve V2 will rotate an actuation handle towards reverse, and a valve will usually be opened [ that is, / although opening when the rotation direction of a valve is closed when an actuation handle is rotated counterclockwise, and it is clockwise rotated by Japanese Industrial Standards is specified / in the case of drawing 13 ] and closed.

[0007] Furthermore, when casing of a driving gear, the valve body of a butterfly valve, etc. are constituted from a synthetic-resin ingredient etc., in order to rotate the valve element connected with the valve rod by the revolution of an actuation handle through the worm and the worm gearing, big torque arises in a worm-gearing shank, gap occurs between the clamp face established in casing of a driving gear by this torque, and the mounting flange face established in the butterfly-valve side, deviation arises in the closing-motion location of a valve, and it becomes the cause of leakage of a fluid.

[0008] Moreover, when the location of an actuation handle was changed, there was the need of also exchanging the closing motion display means of a valve in connection with this, and in order to change a telemeter whenever [ valve-opening ], there was the need of establishing a mounting hole etc. in the top face of casing newly.

[0009] Moreover, the former to a driving gear consists of casing and a lid, combines these and is unifying as shown in JP,7-12786,Y. That is, the configuration differs from the dimension, and casing and a lid are fabricated with respectively separate metal mold, are machined, and are combined. For this reason, when changing the location of an actuation handle into hard flow, casing and a lid were separated, and an internal worm gearing and an internal worm shaft once had to be taken out, and it had to rearrange in the predetermined direction, and was not desirable from the point of the quick nature in activity manday and emergency. This conventional driving gear mainly had many casts, such as cast iron, and working capacity and an appearance (casting surface) needed to form all of a bond part, the sliding section, a bolthole, etc. by machining preferably with the configuration of casing and a lid.

[0010]

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EFFECT OF THE INVENTION

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[Effect of the Invention] According to the driving gear of the butterfly valve of this invention, the effectiveness like a less or equal can be done so.

[0039] 1. Since the clamp face of the same dimension and structure is formed in vertical both sides of casing of a driving gear, and top-and-bottom reversal is carried out, a driving gear is attached if needed and it enables it to change the location of an actuation handle after piping installation of a butterfly valve, while the hand of cut of an actuation handle can be unified and the closing motion operability of a valve improves, the quick nature and the safety in emergency become high.

[0040] 2. They are Two or More Concavo-convex Fitting about Mounting Flange Face Established in Valve Body of Butterfly Valve, and Clamp Face Established in Casing of Driving Gear. Since the hand of cut of a valve rod be make carry out positioning engagement, the torque which act on a worm gearing shank with actuation of an actuation handle be control, can avoid gap between a mounting flange face and a clamp face, and also when a valve body and casing be constitute from a synthetic resin ingredient, gap do not arise between the clamp face established in casing of a driving gear, and the mounting flange face established in the butterfly valve side, and it can prevent leakage of the fluid by the error of the closed position of a valve.

[0041] 3. the need of preparing a closing motion display newly also when the location of an actuation handle is changed — there is nothing — moreover — whenever [ valve-opening ] — a telemeter — the upper and lower sides of casing — since it can attach in any clamp face, it can be coped with, without preparing the mounting section of a telemeter newly whenever [ valve-opening ] with modification of the installation direction of a driving gear.

[0042] 4. Since the mounting phase of a driving gear is changed and the location of an actuation handle can be changed after piping installation of a butterfly valve, the optimal handle position corresponding to the situation of a site can be selected.

[0043] 5. since the geometry of up-and-down casing is the same — molding — public funds — since a mold can be managed with the 1st page and it is formed in dished [ comparatively shallow ], a shaping casting plan is easy and can reduce metal mold costs.

[0045] 6. Since up-and-down casing can be made to serve a double purpose, mass production is made, the manday cutback of preparation of shaping metal mold, mounting, storage, etc. can be performed, since it is the Plastic solid of synthetic resin or a light alloy, quality is stabilized, an appearance is beautiful, and since lightweight-izing is possible, there is a merit a woman employee can also do handling.

[0047] 7. Most up-and-down casing has unnecessary post processing, it is possible to aim at improvement in quality, cost, a delivery date, and service, since two casing is joined and one casing can be completed, and it also has the versatility of the direction of eight kinds of \*\*.

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[Translation done.]

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] This invention uses as an offer plug the driving gear of the butterfly valve which the directivity of an actuation handle is aligned and loses the useless motion at the time of actuation, make it raise workability, and the hand of cut of the actuation handle for \*\*\*\*\* is made in agreement, abolishes a failure, and can make high the quick nature and the safety in emergency while it is orderly and it enables arrangement of a driving gear at a butterfly-valve list also in the part which a narrow tooth space or narrow piping, and a device are \*\*\*\*\*(ing).

[0011] Moreover, can mass-produce at the time of manufacture of a driving gear, the cutback of manday and quality are stabilized, and an appearance is beautiful. While work environment can attain the objects, such as being good, enables shaping of casing and a lid for what has the required metal mold, casing and a lid, of the 2nd page with the metal mold of the 1st page conventionally and being able to aim at the cutback of metal mold costs It fabricates to dished [ shallow ] and a shaping casting plan is made easy, and the cutback of shaping costs can be aimed at, and moreover it is necessary to hardly carry out post processing of the casing of vertical combination, and let the manufacture approach which can be manufactured be an offer plug.

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MEANS

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[Means for Solving the Problem] The means which this invention took in order to solve the above-mentioned technical problem Two or more crevices or heights are formed in the mounting flange face established in the main form butterfly valve. The clamp face of the same dimension and structure of having the heights or the crevice which fits in possible [ said crevice or heights, and engaging and releasing ], and performs a positioning engagement operation to the hand of cut of the valve rod of a main form butterfly valve is formed in vertical both sides of casing. Penetrate valve rod communicating pore to the worm gearing which formed the worm-gearing shank hole in the core of this clamp face, supported to revolve to this worm-gearing shank hole, and has been arranged in casing up and down, and it is punched. While extending the worm shaft of the worm which gears with a worm gearing out of casing and attaching an actuation handle in the extension edge, it is characterized by making possible fitting of the insertion and detachment of the valve rod of a main form butterfly valve, carrying out a revolution to said valve rod communicating pore at one.

[0013] Moreover, 2 \*\*\*\*s of casing are made into a casing-upper half and casing lower half in a part for a center section, and it is characterized by for a casing-upper half and casing lower half having been constituted by the shallow dished Plastic solid which has the same configuration and a dimension, and having joined and constituting them in box-like casing.

[0014] Furthermore, while performing a closing motion display to the clamp face established in casing, it is characterized by attaching a telemeter in a clamp face removable whenever [ valve-opening ].

[0015] Furthermore, concavo-convex fitting is constituted by two or more heights arranged in the position of symmetry centering on valve rod communicating pore, and two or more sets of crevices which fit into these heights, respectively, establishes the crevice of each class in a different phase location centering on valve rod communicating pore, makes selectable the attaching position of casing to a mounting flange face, and is characterized by enabling it to change the location of an actuation handle.

[0016] Furthermore, in a part for a center section, 2 \*\*\*\*s is carried out to a casing-upper half and casing lower half, and vertical both casing is constituted by the shallow dished Plastic solid which has the same configuration and a dimension, a casing-upper half and casing lower half are fabricated with the metal mold of the 1st page which consists of a pair of top metal mold and the Shimokane mold in manufacture of casing of the driving gear of the butterfly valve which joins and becomes one box-like casing, and it is characterized by making post processing unnecessary.

[0017] Furthermore, it is characterized by making the plane of composition of top metal mold and the Shimokane mold become the plane of composition of vertical casing.

[0018]

[Embodiment of the Invention] The desirable example of this invention is explained to a detail, referring to drawing below. In drawing, (1) is a driving gear concerning this invention, and the actuation handle (3) is positioned in one side face of that casing (2). Two \*\*\*\*s (2) of casing are made into a casing-upper half (2a) and casing lower half (2b) from a part for a center section. A casing-upper half (2a) and casing lower half (2b) are constituted by the dished synthetic-resin Plastic solid with shallow same configuration and dimension, and it is joined and they constitute one box-like casing (2).

[0019] Moreover, the clamp face (4a) (4b) is formed in vertical both sides of casing (2), respectively. A clamp face (4a) (4b) arranges and forms four boltholes (6) and two heights (7) in the position of symmetry centering on this worm-gearing shank hole (5) at equal intervals, respectively while it has the same dimension and structure and forms a worm-gearing shank hole (5) in the center of each clamp face (4a) (4b), respectively.

[0020] On the other hand, a mounting flange face (10) is established at the head of the valve shaft tube (9) which begins to be extended toward the method of the outside of the diameter direction from the peripheral face of the valve body (8) of a butterfly valve. By arranging and forming in this mounting flange face (10) four crevices (11) into which said heights (7) fit at equal intervals, and making a crevice (11) carry out fitting of the heights (7) He is trying to make the hand of cut centering on a worm-gearing shank hole (5) carry out positioning engagement of the casing (2) to a mounting flange face (10). In addition, since heights (7) and a crevice (11) are \*\*\*\*\*ed [ each ], it enables it to set up the location of an actuation handle (3) in the eight directions by changing in the four directions on one side, and changing the mounting direction of casing (2) in the eight directions by vertical both sides.

[0021] Moreover, four boltholes (12) corresponding to the above-mentioned bolthole (6) are formed in a mounting flange face (10) at equal intervals, and casing (2) is fixed to a mounting flange face (10) with a bundle with the bolt (13) inserted in these boltholes (6) and (12) from the lower part of a mounting flange face (10). (14) is a bolt which fixes casing (2a) (2b) mutually with a bundle.

[0022] The worm (16) which geared to the worm gearing (15) which sees from a flat surface inside casing (2), and makes a sector, and this worm gearing (15) is arranged enabling a free revolution. It has consistency in said worm-gearing shank hole (5) in the shaft center of a worm gearing (15), and valve rod communicating pore (17) penetrates up and down, and is punched.

[0023] Four key ways (17a) are formed at equal intervals, by making the key (18a) embedded near the head of the valve rod (18) which fixed on the valve body (8) engage with a key way (17a), a valve rod (18) is made as a worm gearing (15), a revolution is made into one, and fitting of the insertion and detachment is made possible to the inner skin of valve rod communicating pore

(17). The end of the worm shaft (19) fixed to the worm (16) extended to the exterior of casing (2), and has attached the actuation handle (3) in the extension edge. If revolution actuation of the actuation handle (3) is carried out and a worm (16) is rotated, a valve rod (18) will rotate through a worm gearing (15), and closing motion revolution actuation of the valve element which was prepared in the valve body (8) and which is not illustrated will be carried out.

[0024] The slit (20) which is in agreement with the direction of a valve element was prepared in the apical surface of a valve rod (18), and while attaching in the apical surface of a valve rod (18) the guide (21) which carried out fitting to this slit (20), the open (O) and close (S) graphic character (22) is stamped on the clamp face (4a) (4b). Moreover, when a valve element rotates to an open position by attaching in a clamp face (4) the plate (25) which attached the limit switch (23) which functions as a telemeter whenever [ valve-opening ], and (24) removable using a bolt hole (6), while the head of a guide (21) points to open (O), the limit switch (23) formed in the open position operates, and an open signal is outputted. Moreover, when a valve element rotates to a closed position, while the head of a guide (21) points to close (S), the limit switch (24) formed in the closed position operates, and a close signal is outputted.

[0025] Packing with which (26) carries out the seal of between a worm-gearing shank hole (5) and casing (2a) (2b), By (27) being packing which carries out the seal of between a worm shaft (19) and casing (2a) (2b), and putting a gasket (28) between the perimeter of the plane of composition of up-and-down casing (2a) (2b) While making a driving gear (1) into drip-proof and waterproof construction, it is considering as the leakage control structure of the lubricating oil from the interior. (29) is a stopper bolt which contacts the flat part of the edge of a worm (15), is screwed in free [ an attitude ] by the stopper boss section (30) formed in casing (2a) (2b), and adjusts the closing motion location of a valve element.

[0026] This invention the mounting flange face (10) formed in the valve body (8), and the clamp face (4a) (4b) formed in vertical both sides of casing (2) Since the hand of cut of a valve rod (18) is made to carry out positioning engagement by concavo-convex fitting by heights (7) and the crevice (11) and it is fixing with a bundle with the bolt (13), not only a bolt (13) but heights (7) and a crevice (11) can be made to pay the actuation reaction force accompanying closing motion of a valve. Therefore, when casing (2), a valve body (8), etc. are constituted from mold goods of a synthetic-resin ingredient, gap between a clamp face (4) and a mounting flange face (10) can be prevented exactly.

[0027] Moreover, heights (7) are arranged in the position of symmetry centering on valve rod communicating pore (17), since two or more sets of crevices (11) into which these heights (7) can fit are established in a different phase location centering on valve rod communicating pore (17), the combination of fitting of heights (7) and a crevice (11) is chosen, and the attaching position of casing (2) in a mounting flange face (10) can be changed. Therefore, as shown in drawing 7, as an actuation handle (3) is located in a pipeline's right-hand side, it attaches a driving gear (1). Or as shown in drawing 8, top-and-bottom reversal can be carried out, a driving gear (1) can be attached, and an actuation handle (3) can be located in a pipeline's left-hand side. Since the installation phase of a driving gear (1) is changed by the number of groups of a crevice (11) also in each installation condition and the location of an actuation handle (3) can be changed, according to the situation of a site, the location of an actuation handle (3) can be selected in the optimal location.

[0028] In addition, when revolution actuation of the actuation handle (3) is usually carried out counterclockwise, a valve element carries out open actuation, and when it is made to rotate clockwise, a valve element carries out close actuation. Therefore, although the hand of cut of an actuation handle (3) is the same when top-and-bottom reversal of the driving gear (1) is carried out, closing motion of a valve element is reversed. However, in this invention, the valve element has adopted the main form butterfly valve rotated 360 degrees. Therefore, even if a valve element rotates to hard flow with the revolution of an actuation handle (3), in order to perform an expected switching action, also when the installation direction of a driving gear (1) is changed, there is no possibility that the consistency of the operability of an actuation handle (3) may be spoiled.

[0029] In the above-mentioned embodiment, while preparing heights (7) in a clamp face (4a) (4b), the crevice (11) is established in the mounting flange face (10), but even if it reverses the relation between heights and a crevice, the same operation effectiveness can be acquired. Moreover, although two heights (7) and four crevices (11) are formed at equal intervals, respectively and it enables it to choose a driving gear (1) from a total of eight sorts of mounting modes, the number of heights (7) and crevices (11) can be changed according to the mounting mode predicted.

[0030] The clamp face established in vertical both sides of casing is formed in the same dimension and structure, and forms the worm-gearing shank hole in the core of each clamp face, respectively. Moreover, the worm gearing supported to revolve free [ a revolution ] is made to penetrate the valve rod communicating pore adjusted in said worm-gearing shank hole up and down, and is punched, and the valve rod of a main form butterfly valve is made engaged possible [ insertion and detachment ] in casing at valve rod communicating pore. therefore, the upper and lower sides of casing — a driving gear can be attached in the valve body of a butterfly valve even if it uses which clamp face. moreover, a main form butterfly valve — a valve rod — forward — reverse — even if it makes it rotate in which direction, an expected closing motion operation is performed. Therefore, since a valve element closes, and a valve element closes when it is made to rotate clockwise, an aperture and when top and bottom are reversed, a driving gear is attached and an actuation handle is rotated counterclockwise, the hand of cut of the actuation handle of the driving gear of all butterfly valves can be unified.

[0031] Moreover, since he is trying to make the hand of cut of a valve rod carry out positioning engagement of the mounting flange face established in the valve body, and the clamp face established in casing by concavo-convex fitting, The torque which acts on a worm-gearing shank with actuation of an actuation handle also when a valve body and casing are constituted from a synthetic-resin ingredient is controlled. Since gap does not arise between the clamp face established in casing of a driving gear, and the mounting flange face established in the butterfly-valve side, an error does not occur in the closed position of a valve and a fluid is not revealed.

[0032] Furthermore, when a closing motion display is performed to the clamp face established in casing and a telemeter is attached in a clamp face removable whenever [ valve-opening ], it can be coped with by changing a telemeter whenever [ valve-opening ] according to the installation direction of a driving gear.

[0033] Furthermore, two or more heights arranged in the position of symmetry centering on valve rod communicating pore again, When two or more sets of crevices which fit into these heights, respectively constitute concavo-convex fitting and the crevice of \*\*\*\*\* is established in a different phase location centering on valve rod communicating pore Since the crevice which carries

out fitting of the heights is chosen, the remaining phase of casing to a flange is chosen and the location of an actuation handle can be changed, according to the situation of a site, the location of an actuation handle can be selected in the optimal location. [0034] Next, the manufacture approach of casing of the driving gear this invention is explained. With reference to drawing 9 and 10, it is manufactured and joined with the metal mold of the 1st page (one pair), i.e., top metal mold, (34), and the Shimokane mold (35), and vertical casing (2a) (2b) which has the same configuration is formed in box-like casing (2). That is, since casing of this invention has fabricated casing of two upper and lower sides only with one pair of metal mold, it has the advantage from which it becomes unnecessary to take the combination of casing into consideration like the conventional casing main body and a lid, and manufacture becomes easy.

[0035] Since fabricated casing is the fabricating operation of resin, it can fabricate dimensional accuracy and a front face beautiful, and its post processing is unnecessary except for post processing of the bolthole of the stopper boss section (30), and the bolthole of the clamp face (4a) (4b). And in order to make this post processing unnecessary, vertical casing was formed in dished [ shallow ], and the draft when extracting a product from metal mold was considered so that fully [ the minimum inclination ]. Ending with inclination with this small draft demonstrates remarkable effectiveness about formation of a worm-gearing shank hole (5) especially. Moreover, the best draft is shown in the revolution section (31) and the packing groove (32) of a worm shaft (19). Shallow opening is sufficient as a junction bolthole (33), and since there are few height dimensions, two or more heights (7) of a clamp face (4) hardly need to take the draft into consideration. Since other parts have neither junction on other components, nor the relation of sliding, draft's are unrelated.

[0036] A up Shimokane mold (34) and (35) are having lateral migration prevented by the alignment section (36) which consists of tabling in a completely different class. As for the contact surface with a worm gearing (15), the precision is influenced by the plane-of-composition list of vertical casing (2a) (2b) with the field relative roughness of both metal mold in the plane of composition (37) of top metal mold (34) and the Shimokane mold (35). The direction in which the actuation handle of a worm shaft (19) is not attached is blockaded after shaping with the plug (42) which consists of hard rubber, resin, etc. A casing rib (38) is a part in which a bolthole (6) is formed, and while making it thickness from other parts, the configuration and thickness are determined from a viewpoint which reinforces the structure of casing.

[0037] With reference to drawing 9, teeming is carried out to casing through a circular sulcus (40) and an introductory slot (41) from an upper initiative ON slot (39). The magnitude of an introductory slot and a number are suitably chosen as the configuration of casing, and a dimension list with a molding material. Exhaust air of the metal mold cavernous section (cavity) is performed to teeming and coincidence. Grouting velocity, a pressure, temperature, etc. change with classes of molding material. The synthetic-resin ingredient as a molding material has desirable thermosetting resin, such as thermoplastics, such as polyethylene and polypropylene, or epoxy, and a melamine. Moreover, a glass fiber and a carbon fiber can be mixed and reinforcement can also be improved. After shaping excises an initiative ON slot (39) and an introductory slot (41), and takes out casing. As for the excision part of an initiative ON slot (39) and an introductory slot (41), it is desirable to consider as a small cross section from the relation of a machined surface the cutback of finishing manday and beautiful as few as possible.

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DESCRIPTION OF DRAWINGS

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## [Brief Description of the Drawings]

[Drawing 1] The top view showing one example of the driving gear concerning this invention

[Drawing 2] The bottom view of drawing 1

[Drawing 3] The top view showing the internal device of drawing 1

[Drawing 4] The A-A sectional view of drawing 3

[Drawing 5] The top view of a driving gear in which the telemeter was attached whenever [ closing motion display and valve-opening ]

[Drawing 6] The perspective view of the upper part of the valve body of a butterfly valve with which the driving gear concerning this invention is applied

[Drawing 7] The top view showing the 1 mounting mode to a pipeline

[Drawing 8] The top view showing a different mounting mode to a pipeline

[Drawing 9] The top view showing a casing manufacture casting plan

[Drawing 10] The sectional view showing a casing manufacture casting plan

[Drawing 11] The top view showing the 1 mounting mode to the pipeline of the conventional driving gear

[Drawing 12] The top view showing a different mounting mode to the pipeline of the conventional driving gear

[Drawing 13] The top view showing another mounting mode to the pipeline of the conventional driving gear

## [Description of Notations]

- (1) Driving gear
- (2) Casing
  - (2a) Casing-upper half
  - (2b) Casing lower half
- (3) Actuation handle
  - (4a) (4b) Clamp face
- (5) Worm-gearing shank hole
- (6) Bolthole
- (7) Heights
- (8) Valve body
- (9) Valve shaft tube
- (10) Mounting flange face
- (11) Crevice
- (12) Bolthole
- (13) (14) Bolt
- (15) Worm gearing
- (16) Worm
- (17) Valve rod communicating pore
  - (17a) Key way
- (18) Valve rod
  - (18a) Thicket key
- (19) Worm shaft
- (20) Slit
- (21) Guide
- (22) Graphic character
- (23) (24) Limit switch (whenever [ valve-opening ] telemeter)
- (25) Plate
- (26) (27) Packing
- (28) Gasket
- (29) Stopper bolt
- (30) Stopper boss section
- (31) The revolution section of a worm shaft
- (32) Packing groove
- (33) Junction bolthole
- (34) Top metal mold
- (35) Shimokane mold
- (36) Alignment section
- (37) Metal mold plane of composition

- (38) Casing rib
- (39) Initiative ON slot
- (40) Circular sulcus
- (41) An introductory slot
- (42) Plug

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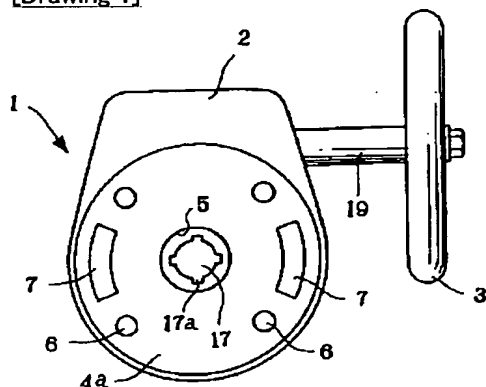
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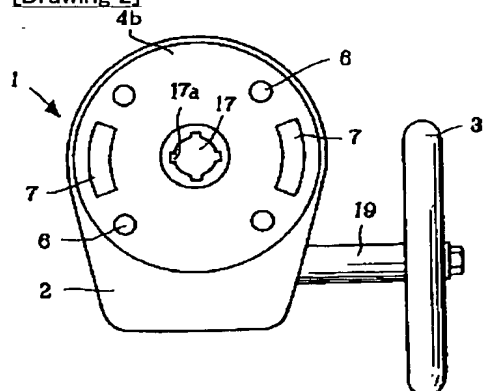
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## DRAWINGS

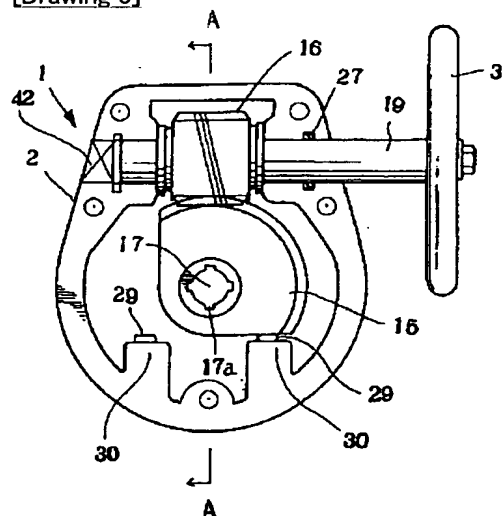
[Drawing 1]



[Drawing 2]

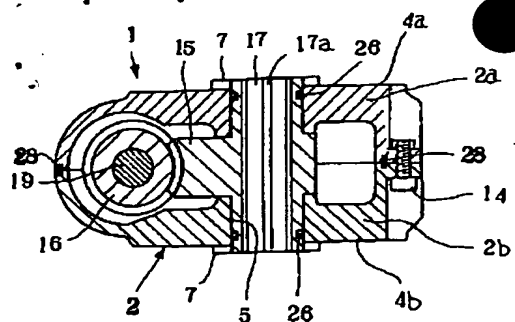


[Drawing 3]

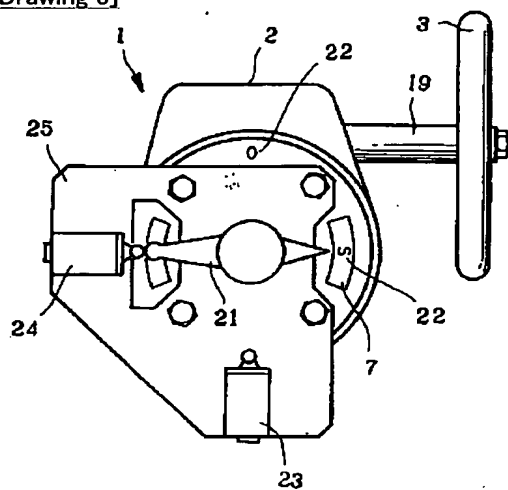


[Drawing 4]

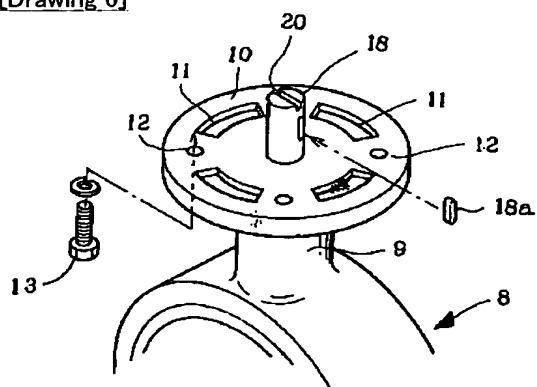




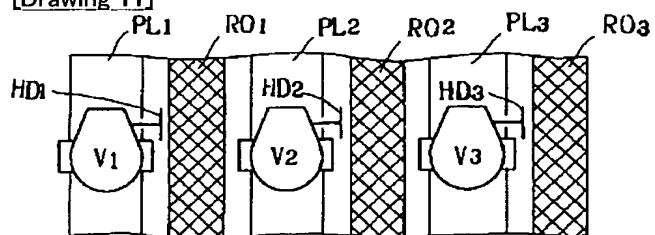
[Drawing 5]



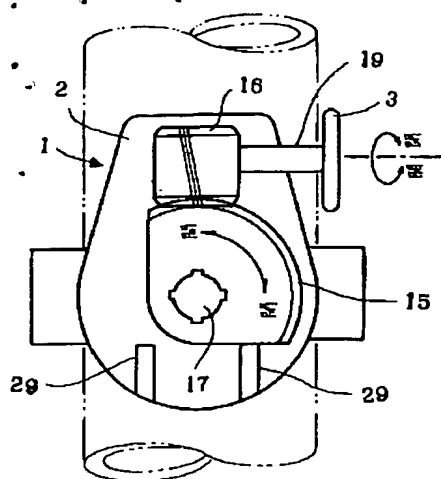
[Drawing 6]



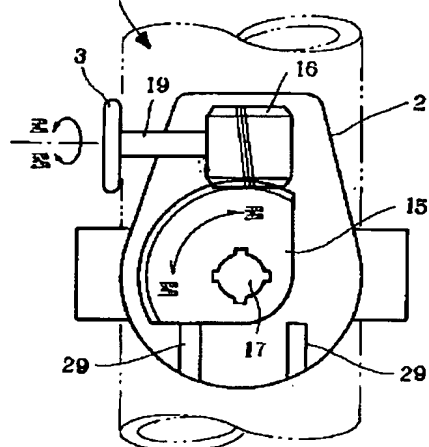
[Drawing 11]



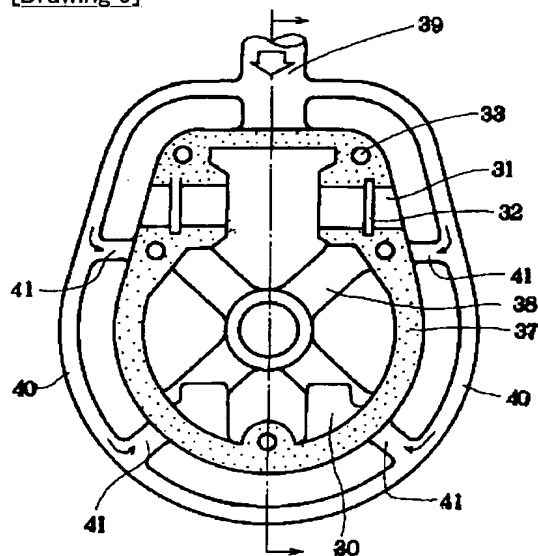
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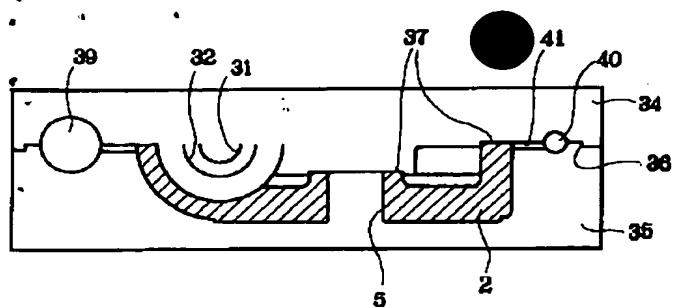
[Drawing 8]



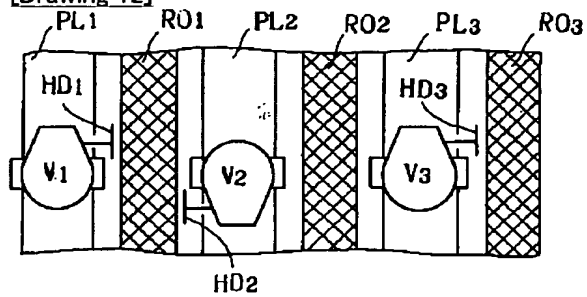
[Drawing 9]



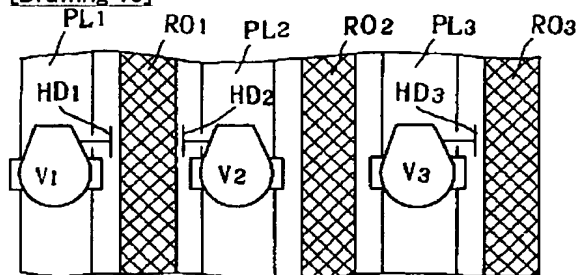
[Drawing 10]



[Drawing 12]



[Drawing 13]



[Translation done.]